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As follows from the theoretical basis and experimental results described above, since an intense laser beam inside the hollow core fiber has a proper profile and, therefore, the trapped particle is damped by the fluid inside the fiber, the particle is confined inside the laser beam and can be transported with the beam without bouncing off the inside walls of the fiber. The size of the particles capable of being guided that way can vary from about 50 nm to about 10 μm . The higher the refractive index of a particle, the larger the optical forces exerted on the particle, and, consequently, the easier it is to manipulate and transport such a particle. Besides water droplets and polystyrene spheres, the substances guided through the fibers were salt, sugar, KI, CdTe, Si and Ge crystals, Au and Ag particles with sizes ranging from about 10 nm to about 10 μm using a 0.5 W laser and a 17 μm inner-diameter air-filled fiber. Listed in Table 1 in Figure 10 are the materials manipulated by laser guidance on a variety of substrates. Since metal particles, such as Au and Ag, for example, usually reflect light well and absorb very little light, larger metal particles can be transported along the hollow core fibers faster. Moreover, since the use of hollow core fibers allows manipulation of a wide variety of particles and virtually opens up the non-contact, non-mechanical way of transporting numerous materials, living cells can be manipulated and guided through the fibers in liquid environments. Examples of the results of fiber guiding for several types of dielectric particles are shown in FIGS. 7(a)-(d). Each image of a short section of fiber in FIG. 7 is captured on a CCD camera. FIGS. 7(a)-(c) show snapshots of polystyrene spheres guided in a water filled fiber. FIG. 7(d) shows an example of a particle guided in an air filled fiber. The track of scattered light in FIG. 7(d) indicates a trajectory of a 1 μm water droplet in a 20 μm diameter fiber.

Please change the Abstract to read as follows: